

Ph.D. program in Statistics and Computer Science  
**41006 – Applied Survival Data Analysis**

Marco Bonetti, Bocconi University

2024/25

The duration of the course is 24 classroom hours. The course aims at providing advanced knowledge in the theory and practice of survival (duration) data analysis.

The course will cover the following core topics:

1. Introduction to survival (time-to-event) data analysis, including relevant quantities and censoring
2. Parametric models
3. Nonparametric estimation of survival functions
4. The log-rank test and other tests
5. Introduction to sample size determination for survival studies
6. The Cox proportional hazards regression model
7. Frailty models

Additional topics may include: Cure rate models; Restricted Mean Survival Time (RMST); Introduction to the counting process notation in survival analysis.

The different topics will be covered with a mix of detailed derivations and constructions of the main quantities and statistics, some R code to implement and illustrate the features of the procedures, and additional readings. Some programming may also be necessary to work on the (individual) assignment. R (or Python) coding will be necessary to work on the assignment, which is part of the course assessment. The assignment may also include the preparation of a short summary of one or more articles.

Grading: Written final exam in class (50% of final grade). You should expect some of the small problems left for you to work on at home to be possible questions on the exam. In addition, one assignment (50% of grade) due on a date to be decided.

Note: Students from non-Statistics Ph.D. programs and qualifying MSc students are encouraged to take the course. A preliminary meeting with the Instructor is suggested to ensure that the statistical material necessary to take this course has indeed been covered in other courses.

Contact information:

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